

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

**SEMICONDUCTOR ENERGY
LABORATORY CO., LTD.**

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Date of mailing
(day/month/year)

01. 3. 2005

Applicant's or agent's file reference
00000PCT7503

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/JP2004/016781

International filing date (day/month/year)

05.11.2004

Priority date (day/month/year)

14.11.2003

International Patent Classification (IPC) or both national classification and IPC

Int.Cl. **G09F9/30**

Applicant

SEMICONDUCTOR ENERGY LABORATORY CO., LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Date of completion of this opinion

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Form PCT/ISA/237 (cover sheet) (January 2004)

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/016781

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/JP2004/ 016781

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>2, 4-24</u>	YES
	Claims	<u>1, 3</u>	NO
Inventive step (IS)	Claims		YES
	Claims	<u>1-24</u>	NO
Industrial applicability (IA)	Claims	<u>1-24</u>	YES
	Claims		NO

2. Citations and explanations

D1: JP 7-312290 A (NEC CORPORATION) 1995.11.28

paragraph [0037]-[0047], figs. 2-4

D2: JP 7-333652 A (HITACHI, LTD.) 1995.12.22

whole document

D3: JP 2003-058077 A (FUJI PHOTO FILM CO., LTD.) 2003.02.28

whole document

**D4: JP 2001-196590 A (SEMICONDUCTOR ENERGY LABORATORY CO., LTD.)
2001.07.19**

The subject matter of claim 1 does not meet the requirement of novelty.

D1 discloses EL device having a current control transistor of which gate electrode is connected to a drain electrode of the switching transistor (figs. 2-4) and i-a-Si and n+-a-Si not extending SiO₂ layer (paragraph [0039], fig.3).

The subject matter of claim 2 does not involve an inventive step over D1 and D2 for the following reasons.

Although D1 does not disclose the technical feature "an edge of the semiconductor film is aligned with an edge of the gate insulating layer", D2 discloses TFT having this feature. Replacing the TFT of invention disclosed in D1 with the TFT disclosed in D2 would have been easily conceived by the person skilled in the art.

The subject matter of claim 3 does not meet the requirement of novelty and that of claim 4 does not involve an inventive step over D1 and D2 for the same reasons described above.

The subject matters of claims 5,6 do not involve an inventive step over D1, D2 and D3 for the following reasons.

D3 discloses that a forming process of gate electrodes on a substrate having photocatalytic surface (e.g. TiO₂ layer) by inc jet method simplifies the manufacturing process of a TFT array.

The person skilled in the art would easily conceive the idea of applying the technical feature employed in D2 to the invention disclosed in D1 to simplify the manufacturing process of a TFT array.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: **V**

The subject matters of claims 7,8 do not involve an inventive step over D1, D2 and D3 because a gate electrode 2 disclosed in D2 is exposed (figs. 1,2).

The subject matters of claims 9,10 do not involve an inventive step over D1, D2 and D3 for the following reasons.

Although D1 does not disclose explicitly the technical feature SiO₂ layer covers both the current control transistor and the switching transistor, SiO₂ layer as a protective film covering both of them is commonly used art.

The subject matter of claim 11 does not involve an inventive step over D1, D2 and D3 because the conductive material specified in claim 11 is commonly used for an electrode.

The subject matters of claims 12,13 do not involve an inventive step over D1, D2, D3 and D4 for the following reasons. D4 discloses forming micro crystal semiconductor film (paragraph [0013]) and mixing halogen and hydrogen at forming semiconductor film paragraph [0029]) to improve the TFT quality. The person skilled in the art would easily conceive the idea of applying the technical feature employed in D4 to the invention disclosed in D1. An electron field-effect mobility of 1 to 15 cm²/Vsec is not special value.

The subject matters of claims 14-20 do not involve an inventive step over D1, D2 and D3 for the reasons described above.

The subject matter of claim 21 does not involve an inventive step over D1, D2 and D3 because the feature "forming the gate insulating film and the first semiconductor film over the case film is performed continuously without being exposed to an air" is well-known art.

The subject matter of claim 22 does not involve an inventive step over D1, D2 and D3 because the feature "the gate insulating layer is formed by sequentially laminating a first silicon nitride film, a silicon oxide film and a second silicon nitride film" is mere matter of design variation.

The subject matters of claims 23,24 do not involve an inventive step over D1, D2 and D3 for the reasons described above.

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